

इंटरनेट

मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 10000-6 (1980): Methods of tests for internal combustion engines, Part 6: Recording of test results [TED 2: Automotive Primemovers]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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Indian Standard
METHODS OF TESTS FOR
INTERNAL COMBUSTION ENGINES
PART VI RECORDING OF TEST RESULTS

1. Scope — Specifies the mode of recording of test results of type tests and performance tests conducted according to IS : 10000 (Part VIII)-1980 'Methods of tests for internal combustion engines, Part VIII Performance tests' and IS : 10000 (Part IX)-1980 'Methods of tests for internal combustion engines Part IX Endurance tests', respectively, for both constant speed and variable speed internal combustion engines.

2. Recording of Observations and Results — The engine shall have reached steady working conditions before taking any reading.

2.1 The readings taken from the various instruments while the test is in progress shall be recorded in a log sheet. The form of the log sheets recommended for the purpose are given in Appendices A, B and C. During the rating test, observations shall be made every one hour. For endurance test, readings shall be taken every one hour as also when there is change in load.

2.1.1 During the fuel consumption test (loop test), the observations shall be made every 30 minutes.

2.2 The results derived from observations shall be plotted as performance curves (see Appendices D and E). These shall form part of the information to be supplied by the manufacturer [see IS : 10000 (Part XI)-1980 'Methods of tests for internal combustion engines, Part XI information required with inquiry or order and information supplied by the manufacturer with the engine']. These curves shall be representative of engine type and design and shall be plotted after the endurance tests conducted according to IS : 10000 (Part IX)-1980 when supplied with the engine. However, the curves shall also be plotted for the engines on which performance test is conducted after they have been type approved.

EXPLANATORY NOTE

The testing and performance of constant speed and variable speed internal combustion engines was earlier covered by the following Indian Standards:

IS : 1600-1960 'Code for type testing of constant speed internal combustion engines for general purposes';

IS : 1601-1960 'Performance of constant speed internal combustion engines for general purposes';

IS : 1602-1960 'Code for type testing of variable speed internal combustion engines for automotive purposes', and

IS : 1603-1960 'Performance of variable speed internal combustion engines for automotive purposes'.

These standards were originally issued in the year 1960 and as a result of implementation of these standards by the manufacturers of engines and testing laboratories, as also the operation of ISI Certification Marking Scheme, these standards have now been extensively revised.

While IS : 1600 and IS : 1602 covered the codes for type testing of constant and variable speed engines respectively, the performance requirements of such engines were covered by IS : 1601 and IS : 1603 respectively. These standards are replaced by two sets of standards, one set covers the methods of testing of engines and the other covers the specification and performance requirements of both constant speed and variable speed engines.

The standard covering methods of tests is being published in following 12 parts (each part covering a particular test method or information related to methods of tests):

IS : 10000 Part I 'Glossary of terms relating to test methods';

IS : 10000 Part II 'Standard reference Conditions';

IS : 10000 Part III 'Measurements for testing, units and limits of accuracy';

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IS : 10000 (Part VI) - 1980

- IS : 10000 Part IV 'Declarations of power, efficiency, fuel consumption and lubricating oil consumption';
- IS : 10000 Part V 'Preparation for tests and measurements for wear';
- IS : 10000 Part VI 'Recording of test results';
- IS : 10000 Part VII 'Governing tests for constant speed engines and selection of engines for use with electrical generators';
- IS : 10000 Part VIII 'Performance tests';
- IS : 10000 Part IX 'Endurance tests';
- IS : 10000 Part X 'Tests for smoke levels, limits and corrections for smoke levels for variable speed engines';
- IS : 10000 Part XI 'Information required with inquiry or order and information supplied by the manufacturer with the engine'; and
- IS : 10000 Part XII 'Test certificates'.

This standard will be complementary to specifications for performance requirements of different types of engines covered by following standards:

- IS : 10001 'Specification for performance requirements for constant speed compression ignition (diesel) engines for general purposes (up to 20 kW)';
- IS : 10002 'Specification for performance requirements for constant speed compression ignition (diesel) engines for general purposes (above 20 kW)';
- IS : 10003 'Specification for performance requirements for variable speed compression ignition (diesel) engines for automotive purposes'; and
- IS : 10004 'Specification for performance requirements for variable speed spark ignition engines for automotive purposes'.

Spark ignition engines for sprayers and similar applications have been covered by IS : 7347-1974 'Specification for performance requirements of small size spark ignition engines for sprayers'.

Two stroke spark ignition engines for automotive applications which were earlier covered by IS : 1603 will be covered by a separate specification.

The revised methods of tests covered by IS : 10000 have been aligned with the current international practices in the field of I C Engines. These parts are in general agreement with the following ISO standards issued by the International Organization for Standardization:

- ISO 3046/I-1975 'Reciprocating internal combustion engines performance: Part I Standard reference conditions and declarations of power, fuel consumption and lubricating oil consumption';
- ISO 3046/II-1977 'Reciprocating internal combustion engines performance: Part II Test methods'; and
- ISO 3046/III-1979 'Reciprocating internal combustion engines performance: Part III Test measurements'.

IS : 10000 Part I to Part XII and IS : 10001, IS : 10002, IS : 10003 and IS : 10004 collectively supersede IS : 1600, IS : 1601, IS : 1602 and IS : 1603.

AMENDMENT NO. 1 FEBRUARY 1985

TO

IS : 10000 (Part VI)-1980 METHODS OF TESTS FOR

INTERNAL COMBUSTION ENGINES

PART VI RECORDING OF TEST RESULTS

(Page 3, Appendix A, columns 15 to 20 in the table) — Substitute the following columns for the existing :

Fuel Consumption					
Fuel Consumed	Fuel Consumption Time	Fuel Consumption Rate	Calculated Specific Fuel Consumption	Correction Factor for Specific Fuel Consumption (β)	Corrected Specific Fuel Consumption
g	s	g/h	g/kWh		g/kWh
(15)	(16)	(17)	(18)	(19)	(20)

APPENDIX A

(Clause 21)

LOG SHEET FOR METHODS OF TESTS FOR CONSTANT SPEED INTERNAL COMBUSTION
ENGINES FOR GENERAL PURPOSES

Name of the Engine Manufacturer

Sheet No. of

Type

Altitude (m)

Model

Engine No.

Nominal Compression Ratio (ϵ_c)

No. of Cylinders

Fuel Specification (According to IS 1460 1974)
(Including Calorific Value and Specific Gravity)Rated Speed (n) rev/minRated Brake Power (P_b) kW

Manufacturers Recommended Grade of Oil

Bore mm

Stroke mm

Dynamometer Type

Cubic Capacity litres

Arm length

Mechanical Efficiency (η_m)

Constant

Place of Test

Date

Testing Laboratory

Observer

Sl No	Time	Baro meter Reading	Temperatures				Exhaust Back Pressure (p_{eb})	Relative Humidity (ϕ)	Observed Speed	Brake Load	Calcu lated Brake Power	Total Correc tion Factor (α)	Cor rected Brake Power	Fuel Consumption						Cooling Water		Lubricating Oil	
			Wet Bulb	Dry Bulb	Air Intake (T_a)	Exhaust Gas (T_b)								Fuel Con sumed	Cor rection Factor for Fuel Consump tion (β)	Cor rected Fuel Con sump tion	Fuel Con sump tion Time	Fuel Con sump tion Rate	Specific Fuel Con sump tion	Temp Inlet ($T_{cool,i}$)	Temp Outlet ($T_{cool,o}$)	Temp (T_o)	Pres sure (p_a)
	s	kPa (mmHg)	K	K	K	K	kPa	Percent	rev/min	kg	kW		kW	g		g	h	g/h	g/kWh	K	K	K	kPa
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)

Note 1 — For points of measurements of air intake temperature, exhaust gas temperature and exhaust back pressure, reference shall be made to IS 10000 (Part I) 1980.

Note 2 — Lubricating oil pressure (see col 24) shall be measured wherever possible.

APPENDIX B

(Clause 21)

LOG SHEET FOR METHODS OF TESTS FOR VARIABLE SPEED INTERNAL
COMBUSTION ENGINES

Name of the Engine Manufacturer

Sheet No _____ of _____

Type

Altitude (m)

Model _____ Engine No _____

Nominal Compression Ratio (ϵ_c)Rated Speed (n) rev/min

Fuel Specification (Including Calorific Value and Specific Gravity) (IS 1460 1974 or IS 2796 1971)

No Load Speed (Observed)

Rated Brake Power (P_b) kW

Bore mm

Stroke mm

Manufacturers Recommended Grade of Oil

No of Cylinders

Dynamometer Type

Cubic Capacity litres

Constant

Mechanical Efficiency (η_m)

Arm length

Place of Test

Date of test

Testing Laboratory

Observers

Sl No	Time	Baro meter Reading	Temperatures							Observed Engine Speed (n)	Brake Load	Total Correction Factor (Δ)	Cal culated Brake Power	Correct ed Brake Power	Fuel Consumption										Smoke Density
			Dry Bulb	Wet Bulb	Air Intake (T _a)	Ex haust Gas (T _b)	Cooling Water/Air		Engine Oil (T _c)						Fuel Consumption		Correction Factor of Fuel Consumption (δ)	Specific Fuel Consumption		Oil Pres sure (T _o)	Exhaust Back pres sure (P _{es})				
							Inlet (T cool ₁)	Outlet (T cool ₂)							Observ ed	Correct ed		Observ ed	Correct ed						
s	kPa (mmHg)	K	K	K	K	K	K	K	rev/min	kg		kW	kW	s	ml(g)	g/h	g/h		g/kWh	g/kWh	kPa	kPa			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	

APPENDIX C

(Clause 2.1)

SPECIFICATION SHEET FOR VARIABLE SPEED ENGINES

DATE OF TEST CERTIFICATE SERIAL NO ..

The following details provide information relating to the Type Test Certificate SI No . ..

MANUFACTURER'S NAME :

A) ENGINE DATA

- i) Type of Model
- ii) Serial Number
- iii) Two/Four Stroke
- iv) Capacity (litres)
- v) Number of Cylinders
- vi) Bore (mm) .
- vii) Stroke (mm) .
- viii) Firing Order .
- ix) Compression Ratio .
- x) Combustion Chamber Type
- xi) Injection Timing
- xii) Fuel System (Petrol/Diesel) .

B) EXHAUST SYSTEM

- i) Back Pressure at Maximum Speed (Full Load) mmH₂O

C) EXHAUST SMOKE METER

- i) Make
- ii) Type .
- iii) Serial Number .

D) COOLING SYSTEM

The type of cooling system used shall be described

E) TYPE OF DYNAMOMETER USED

F) DETAILS OF INTERRUPTIONS DURING TEST (IF ANY)

IS : 10000 (Part VI) - 1980

G) FUEL DATA

- i) Fuel Specification $\left\{ \begin{array}{c} \text{IS 1460-1974} \\ \text{or} \\ \text{IS 2796-1971} \end{array} \right\}$.
- ii) Specific Gravity at °C .
- iii) Calorific Value kJ/kg (kcal/kg) .
- iv) Temperature at the Time of Test K :

H) LUBRICATION DATA

- i) Lubricant Specification :
- ii) Grade :
- iii) Oil Pressure (Hot) Max (kPa) :
- Idling (kPa)
- iv) Sump Capacity (litres) .

J) FUEL INJECTION EQUIPMENT

- i) Pump (make) :
- ii) Pump (reference number) :
- iii) Injector (make) :
- iv) Injector Setting Pressure :
- v) Nozzle (reference number) :
- vi) Release Pressure :

K) CARBURETTOR

- i) Carburettor (make) :
- ii) Carburettor (type) :
- iii) Carburettor jet(s) (size) :

M) GOVERNING SYSTEM

- i) Governor (make) :
- ii) Governor (reference number) .
- iii) Max full load speed, rev/min :
- iv) Max no load speed, rev/min :
- v) Idling speed, rev/min :

N) INDUCTION SYSTEM

- i) Blower (make) .
- ii) Blower (type) :
- iii) Air filter (make) :
- iv) Air filter (reference No.) :

P) ATMOSPHERIC CONDITIONS

- i) Barometer (mmHg) or kPa :
- ii) Air inlet temperature °C (Initial) :
- iii) Air inlet temperature °C (Final) :

APPENDIX D

(Clause 2.2)

PERFORMANCE CURVES SHEET FOR CONSTANT SPEED ENGINES

Test No.

Engine Manufacturer.....

Type....., Model....., Serial No. Date.....

No. of Cylinders..... Bore..... mm, Stroke..... mm

Cubic Capacity..... litres, Compression Ratio (ϵ_c)

Fuel (IS : 1460-1974).....

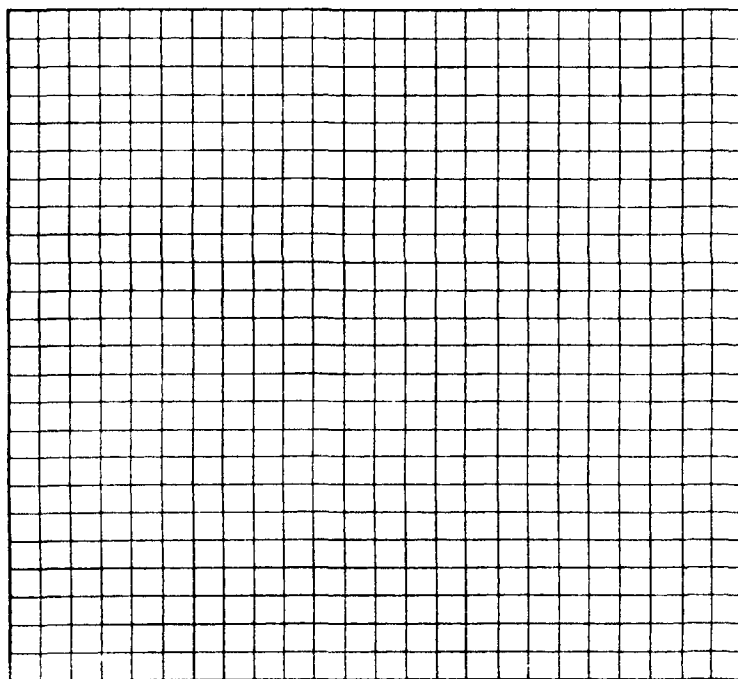
(including calorific value and specific gravity)

Atmospheric Conditions: Ambient temp.....K

Altitude.....m, Relative Humidity..... Percent, Air Intake Temp.....K

Engine Log Sheet No.

SPECIFIC FUEL CONSUMPTION (CORRECTED) g/k Wh



TOTAL FUEL CONSUMPTION (CORRECTED) g/h (a)

EXHAUST TEMPERATURE °C (b)

CORRECTED BRAKE POWER AND LOAD PERCENT

APPENDIX E

(Clause 2.2)

SPECIMEN PERFORMANCE CURVES FOR VARIABLE SPEED ENGINES

